TRANSYSTEMS CORPORATION

APPENDIX A.VIII Memorandum

TO: Deana Swetlik, EDAW

FROM: Mike Wahlstedt

RE: 21st Street Corridor Study – Future Traffic Projections

DATE: July 26, 2004 (updated August 2nd and August 9th, 2004)

Existing Planned Improvements

In order to put the proposed 21st Street Corridor alternatives into the appropriate context, it was first necessary to document projects that are already planned in the area that may influence traffic operations and may also already be identified for funding. In general, there are two sets of programs in which these roadway improvements may fall under, the Capital Improvements Program (CIP) or the Transportation Improvement Program (TIP). The CIP projects are shorter term projects, slated to occur within the next five to ten years. These projects are a part of the City's budgeting process and thus money has been set aside for these projects in the budget. This does not guarantee funding and the City reprioritizes it's funding on an annual basis, but these are generally projects the City plans to move forward with.

The TIP projects are identified through the long-range transportation planning process as future needs. Some of these projects may also be included in the CIP (e.g. for shorter term implementation), others are projects identified as needs over the next 30 years. While no money is set aside for these projects, the plan is "fiscally constrained". In other words, the value of the projects is compared to anticipated revenues from a variety of sources, including City, County and KDOT funding over the 30 year period to provide some assurance that there will be reasonable funds available to construct these projects.

2004 Capital Improvements Program

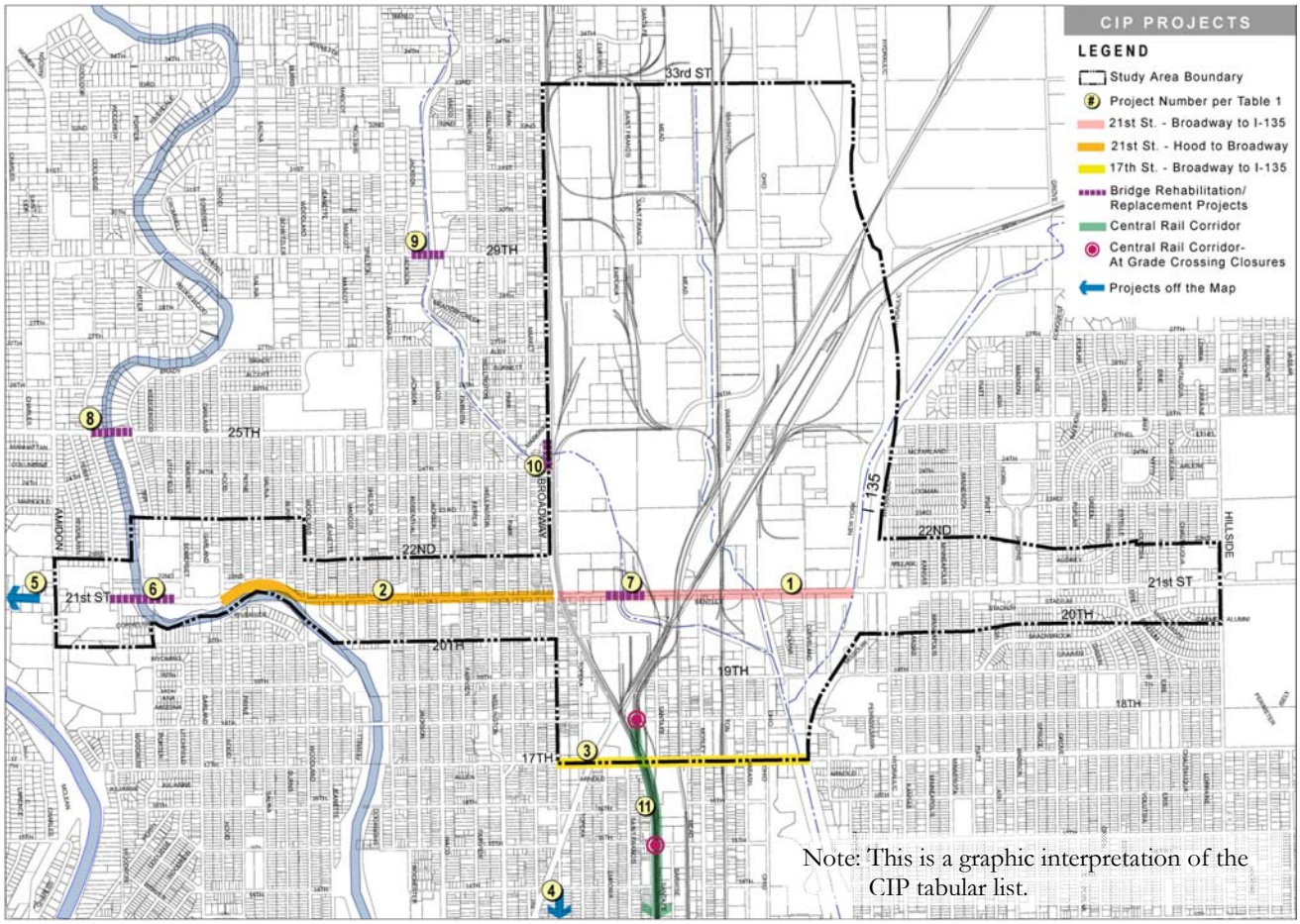
The following table summarizes projects in the vicinity of the 21st Street corridor that are currently on the CIP.

Table 1. 2004 CIP Projects In or Near Study Area

	Project	Est. Cost (in 2004 dollars)	Est. Year	Comments
1	21st St. – Broadway to I-135	$2,895,000	2011	Reconstruct and widen 21st St. to a five lane roadway
2	21st St. – Hood to Broadway	$4,500,000	2005-6	Reconstruct and widen 21st Street to a 4/5 lane roadway
3	17th St. – Broadway to I-135	$6,850,000	2006-8	Reconstruct
4	*13th & Broadway	$2,435,000	2005	Intersection Improvements
5	*21st St. Bridge at Big Arkansas River	$850,000	2008	Replace bridge
6	21st St. Bridge at Little Arkansas River	$640,000	2007	Rehabilitate bridge
7	21st St. Bridge over Chisholm Creek	$781,000	2005	Rehabilitate bridge near Francis Street
8	*25th St. Bridge at Little Arkansas River	$300,000	2006	Rehabilitate bridge
9	*29th St. Bridge over Chisholm Creek	$760,000	2008	Rehabilitate bridge
10	Broadway Bridge at East Fork Chisholm (confirm location)	$1,165,000	2011	Replace bridge
11	*Central Rail Corridor	$98,900,000	2004-6	Grade Separations/ Road Closures

** Projects outside the actual 21st Street North Revitalization Plan boundary*

Map 1. 2004 CIP Projects In or Near Study Area



2030 Transportation Plan (1999 Update)

The following projects in the vicinity of the 21st Street corridor are shown on the 2030 Transportation System Improvements Map in the Transportation Plan. The projects listed in bullet form below are an interpretation from the 2030 Transportation Plan map (as a tabular listing of the projects was not included in the Transportation Plan).

- 21st Street – Broadway to I-135, widen to five lanes (also in CIP)
- 21st Street – Hillside to Rock, widen to five lanes
- 21st Street and I-135 Interchange Improvements (We believe this has been completed per the CIP)
- Arkansas – 21st Street to 45th Street, widen to three lanes (also in CIP)
- Waco – 15th Street to 21st Street, widen to three lanes (also in CIP)
- 17th Street – Broadway to I-135, widen to three lanes (also in CIP)
- 25th Street – Arkansas to Broadway and south to 21st Street, widen to four lanes (this is similar to the 21-25 connection shown in the 21st Street Transportation Alternatives, but smaller in scale).
- Railroad Grade Separations on UP line at Central, 9th, 13th, 17th and 21st Streets
- 25th & I-235 Interchange Improvements and "Big-Ditch" crossing
- *13th Street – Waco to Rock, widen to five lanes
- *Zoo Blvd. – I-235 to Ridge, widen to seven lanes
- *13th Street at I-235, widen to four lanes

** Projects outside the actual 21st Street North Revitalization Plan boundary*

21st Street Corridor Study Alternatives Analysis

Three street network alternatives were developed by EDAW and TranSystems in consultation with the City, plus a number of sub-alternatives. City staff had indicated that in the area of 21st/25th/29th there needed to be at least one major east-west route between I-135 and I-235 to serve traffic needs in this area. Each of the alternatives emphasizes one of these routes. In general, these alternatives are summarized below:

Alternative A – "21st Street Alternative". In this alternative, 21st Street would be elevated over the tracks on a 4 lane bridge and would continue west of Broadway as a 5-lane roadway. Twenty Ninth Street would be closed across the tracks east of Broadway. Sub-Alternative A-1 reduces 21st Street to 3 lanes west of Broadway.

Alternative B – "29th Street Alternative". In this alternative, 29th Street would be elevated over the tracks on a 4 lane bridge. Twenty First Street would also be elevated over the tracks, but on a two lane bridge and 21st Street would also be narrowed to three lanes west of Broadway. Sub-Alternative B-1 includes a 4-lane bridge on 21st Street.

Alternative C – "21st-25th Alternative". In this alternative, west of I-135 21st Street would be realigned to curve north and connect to 25th Street east of Broadway. The existing 21st Street east of Broadway would be realigned to "tee" into this new roadway. Twenty Ninth Street would be closed across the tracks east of Broadway. Twenty First Street would remain 4 lanes west of Broadway. Sub-Alternative C-2 reduces 21st Street to 3 lanes west of Broadway.

More detail on these alternatives and the sub-alternatives is provided on the EDAW "Transportation Alternatives" figure and the "Vehicular Transportation Alternatives to Model" matrix.

Transportation Model Traffic Projections

The City of Wichita provided future traffic projections for each of the alternatives. The alternatives were developed using the City's traffic model. This model consists of a network of the City's major streets and land use forecasts. Each street is assigned a capacity based on the number of lanes and an assumed traffic speed. The land use data is broken down into zones – areas generally bounded by the major street grid. For each zone, the future population and employment has been estimated. Once all of this data is loaded into the model, the model attempts to estimate each person's trip from home (population data) to work (employment data) and back, as well as other non-work based trips. The trips are assigned by finding the fastest path along the street network based on the assigned roadway speeds. However, once a roadway reaches capacity, no more traffic can use that road and the model assumes that the excess traffic will then find the next fastest route.

In order to model the proposed alternatives the 2030 model was used, which includes all of the planned roadway improvements included in the 1999 transportation plan as well as the forecasted growth in population and employment for each zone. In order to provide a valid comparison for the transportation alternatives, however, all of the planned transportation improvements in the City's model within the area bounded by 13th Street, 37th Street, Amidon and Hillside were deleted from the model (existing conditions were assumed) and then the proposed 21st Street Transportation Alternatives were added back in.

Given the macro level study that the City's modeling provides, the future land use assumptions in the City's transportation model were not changed. Since the economic analysis completed for the 21st Street North Revitalization Plan resulted in recommendations of very modest growth to occur in all market segments – commercial, industrial and commercial, through our 20 year planning horizon for our Plan Area; we are assuming that the City's model and land use assumptions adequately calculate the impact of growth on the transportation system within and adjacent to the study area.

To reiterate, the City's model is a rough planning tool best used for comparisons between significant projects over a large area. It is not generally sensitive enough to measure impacts of detailed improvements at a specific intersection (e.g. adding a left-turn lane) as the only factors that can really be controlled in the model are the roadway capacity and speed over segments of one-half to one-mile. Grade separations of railroad crossings are simply modeled by assuming that if the crossing is removed, average speeds on the roadway will increase.

One thing that should be noted about the model is that it appears that in the 2030 model there is not sufficient capacity for east-west traffic in the central portion of the City from the western suburbs into the CBD, such as on Kellogg, Central and 13th Street. In the model, once these roadways reach capacity, it assumes that drivers will find the next fastest route, creating a "domino" effect, pushing traffic to 21st Street, then to 29th Street, etc. Thus, if capacity is added to 13th Street or 21st Street, it then pulls traffic away from 29th Street.

Utilizing all of these assumptions, the proposed transportation alternatives were programmed into the model. The resulting traffic projections are summarized on ***Table 2.***

Table 2
2030 Daily Traffic Projections
MAPD Model

Link	2002 ADT	2030 Model Projections						
		Base	A	A-1	B	B-1	C	C-2
21st St. w/o Waco	16,785	23,000	28,000	20,000	19,000	21,000	22,000	18,000
21st St. w/o Broadway	16,700	20,000	26,000	20,000	15,000	18,000	20,000	17,000
21st St. e/o Broadway	14,880	22,000	26,000	23,000	15,000	23,000	14,000	13,000
21st St. w/o I-135	13,757	21,000	26,000	24,000	15,000	23,000	26,000	26,000
25th St. w/o Broadway	1,311	11,000	11,000	14,000	12,000	16,000	17,000	21,000
25th St. e/o Broadway	--	1,000	8,000	8,000	1,000	1,000	12,000	13,000
29th St. w/o Broadway	7,454	9,000	9,000	10,000	16,000	15,000	4,000	4,000
29th St. e/o Broadway	7,409	9,000	n/a	n/a	16,000	14,000	n/a	n/a
29th St. w/o I-135	7,409	10,000	10,000	10,000	19,000	17,000	6,000	6,000
Broadway s/o 21st St.	9,218	17,000	17,000	18,000	16,000	16,000	18,000	18,000
Broadway n/o 21st St.	12,011	19,000	21,000	24,000	19,000	24,000	17,000	18,000
Broadway n/o 25th St.	10,073	14,000	13,000	13,000	16,000	15,000	14,000	13,000
Broadway n/o 29th St.	8,985	11,000	10,000	10,000	10,000	9,000	11,000	11,000
Waco s/o 21st St.	5,209	--	11,000	8,000	16,000	10,000	10,000	8,000
Ohio s/o 29th St.	--	1,000	8,000	8,000	1,000	1,000	4,000	4,000

The City of Wichita has also established some guidelines for the number of lanes required to accommodate various traffic volumes. These ranges are summarized below.

Table 3
Typical Roadway Capacities
Daily Traffic Volumes

Lanes	Light Congestion	Medium Congestion	Heavy Congestion
2	10,000 - 12,000	12,000 - 14,000	>14,000
3	12,000 - 15,000	15,000 - 17,000	>17,000
4	19,000 - 22,000	22,000 - 25,000	>25,000
5	24,000 - 26,000	26,000 - 30,000	>30,000
6	28,000 - 34,000	34,000 - 40,000	>40,000
6/7	31,000 - 37,000	37,000 - 45,000	>45,000

In our opinion, the "medium congestion" category is likely what you would normally design to on your major streets in an urban area. Note that these are "rules of thumb" and that the actual capacity of a roadway can vary greatly depending on a number of factors, including the type of adjacent development, the number of traffic signals, lane widths, the number of driveways, the presence of turn lanes, the ratio of turning traffic to through traffic, the portion of traffic occurring during the "rush hour" periods relative to the rest of the day, etc. The primary factor controlling capacity of a roadway along a corridor is the capacity of the major intersections. If left and right turn lanes are provided at these intersections and the traffic signal is well timed, higher capacities can be achieved. For instance, in some instances three lane roads have been measured with traffic volumes in excess of 20,000 vehicles per day without major congestion when the intersections are appropriately designed. Similarly, lack of turn lanes and efficient signal operation at key intersections can reduce the capacity below these levels.

Alternative A

In this scenario, with the five lane section on 21st Street and the closure of 29th Street east of Broadway, significant traffic growth is experienced on 21st Street west of Broadway. Traffic volumes on 21st Street from I-135 west to Arkansas are in the 26,000 to 28,000 range, volumes that support the need for the five lane section. Traffic on 25th Street and on 29th Street west of Broadway would be in the 10,000 vehicles per day range, similar to the Base Scenario and supportable by the existing two lane section of 25th Street North and the 4 lane section of 29th Street North. While the two-lane section on 25th Street west of Broadway can continue to support the projected traffic, note that the increase from 2,000 vehicles per day to more than 10,000 vehicles per day will have an impact on the character of this roadway in the neighborhood.

By improving 25th Street/Ohio east of Broadway and extending to 29th Street, traffic volumes on this roadway increase from the current 1,000 or so vehicles per day to around 8,000. This traffic volume can be supported by a two lane roadway; however, if this route is going to be one of the key collector routes through this area and serve the planned redevelopment of this area, we would recommend that a three lane section be utilized to allow more efficient operation.

Alternative B

By constructing a four lane bridge over the rail yards on 29th Street and grade separating the 29th Street and Broadway intersection, a significant amount of traffic is attracted to the 29th Street corridor. The reduction of 21st Street to two lanes over the tracks and three lanes west of Broadway also influences the traffic volumes on 29th Street. The traffic volume projected on 29th Street west of Broadway of about 16,000 indicates that this current four lane section is adequate.

The traffic volumes on 21st Street over the bridge and west of Broadway are in the 15,000 range and are supportable by the 2 lane bridge and 3 lane roadway proposed. The traffic projections also indicate a significant growth on Waco, to nearly 16,000 vehicles per day south of 21st Street. This is likely due to the constraint in capacity on 21st Street to the east causing traffic to find alternative routes to the south of 21st Street and returning to 21st Street via Waco. The 16,000 vehicles per day traffic volume would indicate the need to widen this roadway to three or four lanes between 13th and 21st Streets.

In the "B-1" scenario, where 21st Street remains at 4 lanes over the railroad tracks, more traffic is attracted back to 21st Street, with traffic volumes increasing to 23,000 over the bridge. The limitation of three lanes west of Broadway in the model keeps the traffic in this section down to around 18,000, but it jumps back up to 21,000 west of Waco. Traffic on Waco in this scenario is around 10,000. Traffic volumes on 25th Street also increase to around 16,000 in this scenario, likely due to the added capacity on the 21st Street bridge and the constraint of the 3 lane section on 21st Street west of Broadway. The 16,000 volume would indicate the need to widen 25th Street to at least 3 lanes.

Little traffic uses the 25th/Ohio connection east of Broadway in these scenarios; however, the three lane section would still be desirable to support the local access and collector street function of this roadway.

Alternative C

With the direct connection of 21st Street at I-135 to 25th Street at Broadway and the closure of 29th Street east of Broadway, a significant amount of traffic shifts to 25th Street, as expected. The projected traffic volume on 25th Street west of Broadway of 17,000 indicates the need to improve this roadway to three or four lanes. Significant traffic volumes also remain on 21st Street west of Broadway, in the 20,000 to 22,000 range requiring at least the existing four-lane section. Near I-135 traffic volumes are in the 26,000 range, indicating the need for a five lane section between I-135 and the bridge.

Traffic volumes on 29th Street drop to a minimal 4,000 vehicles per day west of Broadway easily supported by the existing four lane section. Traffic volumes on Ohio Street between 29th Street and the bridge are also in the 4,000 range, again a three lane section is recommended here.

In the "C-2" scenario, 21st Street would be reduced to three lanes west of Broadway. This shifts about 3,000 vehicles per day from 21st Street to 25th Street, reducing the volume on 21st Street to around 17,000 which could be supported by a three lane section, and increasing it on 25th Street to about 21,000 necessitating a four to five lane section (four lanes should be sufficient through the residential areas, widening to five lanes at the intersections with Broadway and with Arkansas).

Bicycle, Pedestrian and Transit Considerations

Bicycles and Pedestrians

There are currently no designated bike paths in the study area on the City's system. However, it is our understanding that 25th Street is planned to be a bike route based on the City's Parks and Open Space Plan (in addition to other routes/paths identified in the plan that would occur in our study area as identified in the analysis). Improvements to 25th Street will be required to include a 10 foot off-street bicycle/pedestrian path on one side of the street.

In addition, the proposed improvements for 21st Street will include wider sidewalks in the Broadway to Waco section as well as bicycle and pedestrian accommodations on the proposed bridge over the railroad tracks, which should significantly improve bicycle and pedestrian accessibility through this currently prohibitive corridor.

Sidewalks are recommended to be included with all of the identified roadway improvements in the study corridor, and should be constructed as detached sidewalks with an adequate tree lawn and/or amenity zone between the walk and the curb, depending on whether the street traverses a residential or commercial area.

Transit

Wichita Transit has several routes in the area:

- N. Waco – Travels from downtown up Waco to 21st Street, west on 21st Street to Jackson, west to Arkansas continuing north to 37th Street
- N. Broadway – Travels from downtown up Broadway to 20th Street, then west to Market, north to 21st Street and then east on 21st Street to the WSU area
- N. Riverside – Travels from downtown to 13th & Nims, then west on 13th Street, north on Amidon, east on 21st Street to Somerset and then north to near 27th & Arkansas

The Waco route will have minimal impact from the proposed alternatives, with the exception that transit stop amenities will likely be included with the streetscape improvements on 21st Street west of Broadway. The Broadway route will also benefit from the transit stop improvements in the corridor, but will receive the greatest benefit from the grade separations at the rail crossings, allowing an improvement in travel time and reliability, both important factors in transit ridership. No significant impacts are anticipated to the Riverside route.

In general, bus stops occur rather sporadically. Wichita Transit informed TranSystems that they do not have any designated stops and tend to stop at every corner. Most transit agencies have designations such as 'every two blocks,' and 'far side vs. near side' stops (relation of where bus stops to the intersection). Site analysis did show the presence of some signs and benches, but in general there seems to be a significant lack of cohesiveness and transit identity. While improvements or modifications to the existing routes are not anticipated as a result of this planning process, amenity improvements to stops are definitely warranted. Providing clear stops, with benches, shelters, trash cans, a paved area at the stop, posting of schedules, and/or allowing advertising for the local neighborhood, can all help improve the image of a neighborhood or district, and may also increase ridership.

Summary

All three of the alternatives appear to be feasible with regard to accommodating the future vehicular transportation needs in the greater northwest area of the city, as well as within the study area; however, the transportation benefits of each will have to be taken into consideration in balance with the overall redevelopment objectives of the corridor study.

Widening 21st Street to five lanes appears to be the most attractive alternative for motorists, as the City's east-west traffic demand appears to be focused primarily from 21st Street North and to the south. However, widening 21st Street through the Broadway to Arkansas corridor will have a significant impact on the character of this area as a neighborhood retail district as property will have to be acquired (increasing ROW from 60' to 95'). This will result in buildings being removed and businesses that will have to be relocated. Based on a visual survey of an aerial photograph, it appears that 13 structures would be removed and property would be acquired on 37 parcels.

On the other hand, it appears that 21st Street could be narrowed to three lanes in the Broadway to Waco corridor, however, this will push the travel demand farther north and will require that 25th Street be widened between Broadway and Arkansas. This section of 25th would have to be widened to accommodate four lanes and the City's planned bike lane, which will in turn have an impact on this residential area.

Here the ROW would increase from 60' to 80'. It should be noted that regardless of the various improvement alternatives, that this section of the 25th Street corridor will experience a significant growth in traffic over the next 20 years due to general traffic growth and the construction of the big ditch crossing to the west. Provided the widening will only affect one side of the street (assuming south here), a visual analysis here shows that seven residences and one commercial structure would have to be removed. Further, the City's data shows that there are currently five vacant properties and one city-owned property located along the south side of this stretch of 25th Street.

Similarly, without the closure across the BNSF tracks, 29th Street also experiences general traffic growth. The existing four lane section on 29th Street west of Broadway to Arkansas is adequate to serve the traffic amounts anticipated. As in all other cases, designated left turn lanes at significant intersections may need to be accommodated, primarily at Broadway and Arkansas. The 29th Street corridor can also handle the additional traffic demand created by the narrowing of 21st Street with the addition of grade separating the roadway across the BNSF tracks; however, it would still be desirable to grade separate 21st Street as well (in the Central sub-area) in order to satisfy the railroads desires to reduce at grade crossings and to improve the travel times and perceived safety impacts of the at-grade crossings.

Items to Consider (by EDAW)

- Establishment of any one east-west connection as the major northwest/study area community connector will result in increased traffic and higher travel speeds on that one corridor. Higher travel speeds often equate to less local stops and is less appealing and safe from a pedestrian standpoint.

- In general providing more connections, or options for vehicles helps to disperse traffic, reduces undo pressure on one particular street in a system, and offers choices for users.
- Any required increase in ROW will result in additional costs beyond traditional street improvements within an existing ROW. Costs to consider will be proportionate to the amount of additional ROW that is required, the number of parcels affected, businesses or residents that will have to be relocated, structures to demolish, etc. This proportionately may very likely equate to an implementation timeframe.
- An appropriately design street, utilizing adequate traffic calming techniques, can help mitigate some of the safety concerns often associated with higher capacity streets.
- It is critical to consider first the type or character of place that is desired, so that context sensitive design results that is a marriage of land use, urban design and transportation solutions. It is essential to balance considerations of travel time with community character.
- The enclosure ratio (describes the relationship of building faces, the height of buildings and the overall width of the street) of an urban neighborhood retail street is often associated with the overall economic success level of the street as a viable commercial district.
- Keep in mind that those transportation alternatives identified that include ROW widening currently do not account for on-street parallel parking.
- The north-south streets of Market and Park appear to have traffic volume's low enough to convert these streets to two-way, with on-street parallel parking where feasible. The current typical ROW on these north-south side streets leading into 21st Street North are 60.' The need for designated left turn lanes at intersections (from side streets onto 21st) will have to be looked at on a case by case level during detailed design and engineering.
- Typically, long distance through traffic is discouraged within a neighborhood activity center.
- At some point during every 'person trip' made, that individual is a pedestrian:
    - whether they are traveling by car from within our outside of the region to the special district, parking once and then walking to shops;
    - whether they are a bicyclist, at some point the bicycle is parked and the individual is a pedestrian.
    - whether they are a transit rider, at some point they will walk to and from the stop to their home or shops.
    - whether a resident of the neighborhood is walking to their job in the area or to a shop.
    - whether an employee in the area is walking to lunch in the neighborhood.